

TYPHOON GERALD (14W)

Typhoon Gerald developed in early September in an active monsoon trough at the same time that Typhoons Freda (13W) and Holly (15W) were intensifying further to the east. Gerald was unique in that it matured within the monsoon trough and did not detach from it. The most distinctive feature of Gerald was an unusually large eye.

After Typhoon Dinah (11W) moved northward through the East China Sea and became extratropical in the Sea of Japan, the minimum sea-level pressures (MSLPs) east of the Philippine Islands remained slightly lower (1005 mb) than the seasonal mean of 1007 mb. This below normal low-pressure area was not

mentioned as a suspect area on the Significant Tropical Weather Advisory (ABPW PGTW) until 020600Z September, when persistent convection appeared.

A Tropical Cyclone Formation Alert (TCFA) at 020830Z upgraded the suspect area in the Philippine Sea after a sudden flare-up of convection within the cloud system. Almost immediately the central convection fell apart as the poleward edge of the cirrus outflow flattened, restricted by the amplification of a mid-latitude trough to the north. Cancellation of the first TCFA on the monsoon depression area followed at 030800Z (Figure 3-14-1). The arrested development of the monsoon

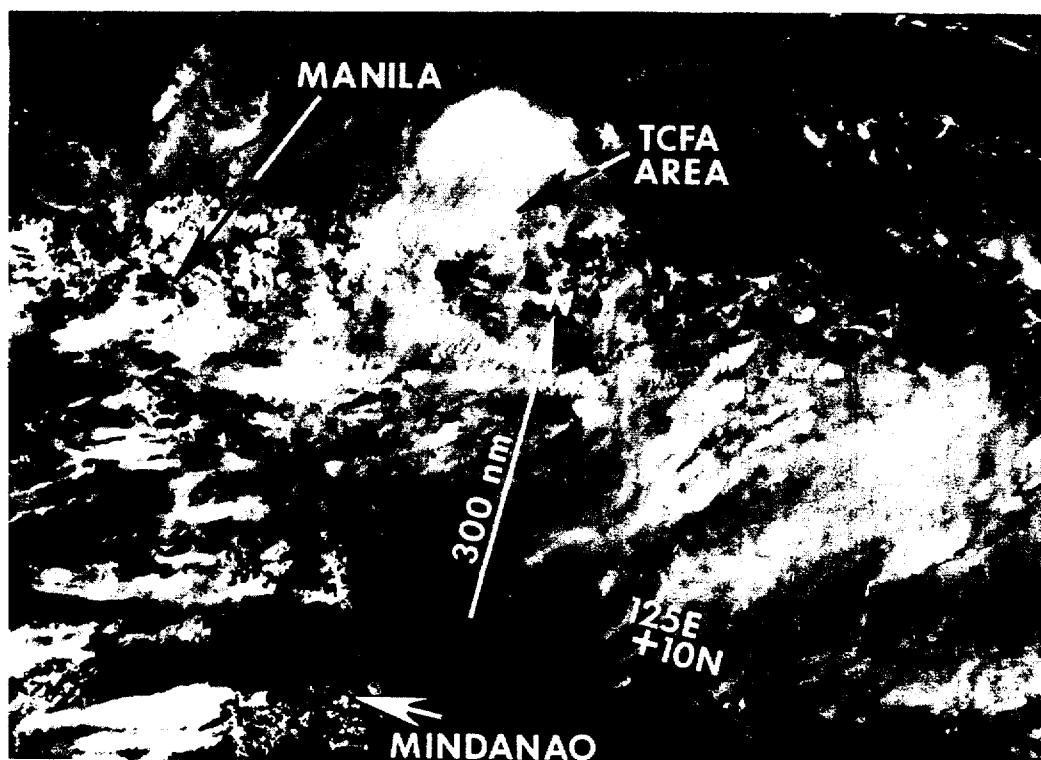


Figure 3-14-1. A broad band of cloudiness associated with the southwest monsoon extends eastward across the central Philippine Islands (030653Z September NOAA visual imagery).

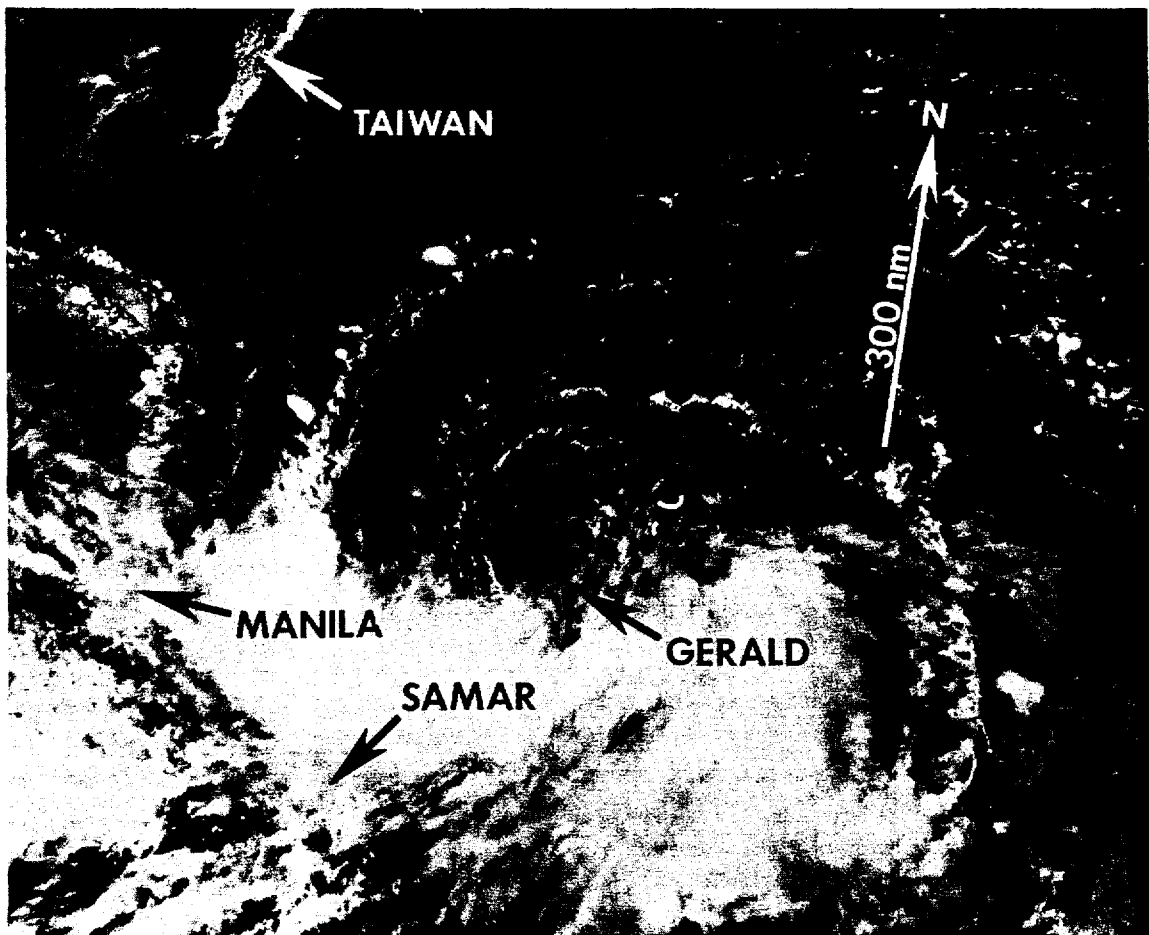


Figure 3-14-3. Due to northerly flow aloft, convection associated with the low-level circulation center was confined to the southern semicircle (040642Z September N(OAA visual imagery).

depression appears to be related to the movement of an upper-level wind maximum across the island of Kyushu, Japan. This resulted in an increase in northerly flow over the northern Philippine Sea (Figure 3-14-2). This increased upper-level wind shear was responsible for delaying Gerald's development beyond the monsoon depression stage.

At 040600Z, synoptic data obtained from drifting buoy and ship reports indicated the MSLP had dropped to 1003 mb with 25 to 30 kt (13 to 15 m/sec) winds near the circulation center. Satellite imagery also showed an exposed low-level circulation was displaced slightly to the north of a single major convective band (Figure 3-14-3). These data

prompted the issuance of a second TCFA at 041000Z. The first warning on Tropical Depression 14W followed at 041800Z, supported by a Dvorak intensity estimate of 30 kt (15 m/sec) and a drifting buoy report of a 1001 mb that revealed falling surface pressures.

Since Gerald was a shallow low-level circulation in an active monsoonal trough, its movement was erratic and difficult to forecast. During the period 040000Z to 071800Z, the primary numerical aid, the One-Way Interactive Tropical Cyclone Model (OTCM), was used by JTWC to forecast movement.

JTWC forecast Typhoon Gerald would slowly recurve to the east of Taiwan, however,

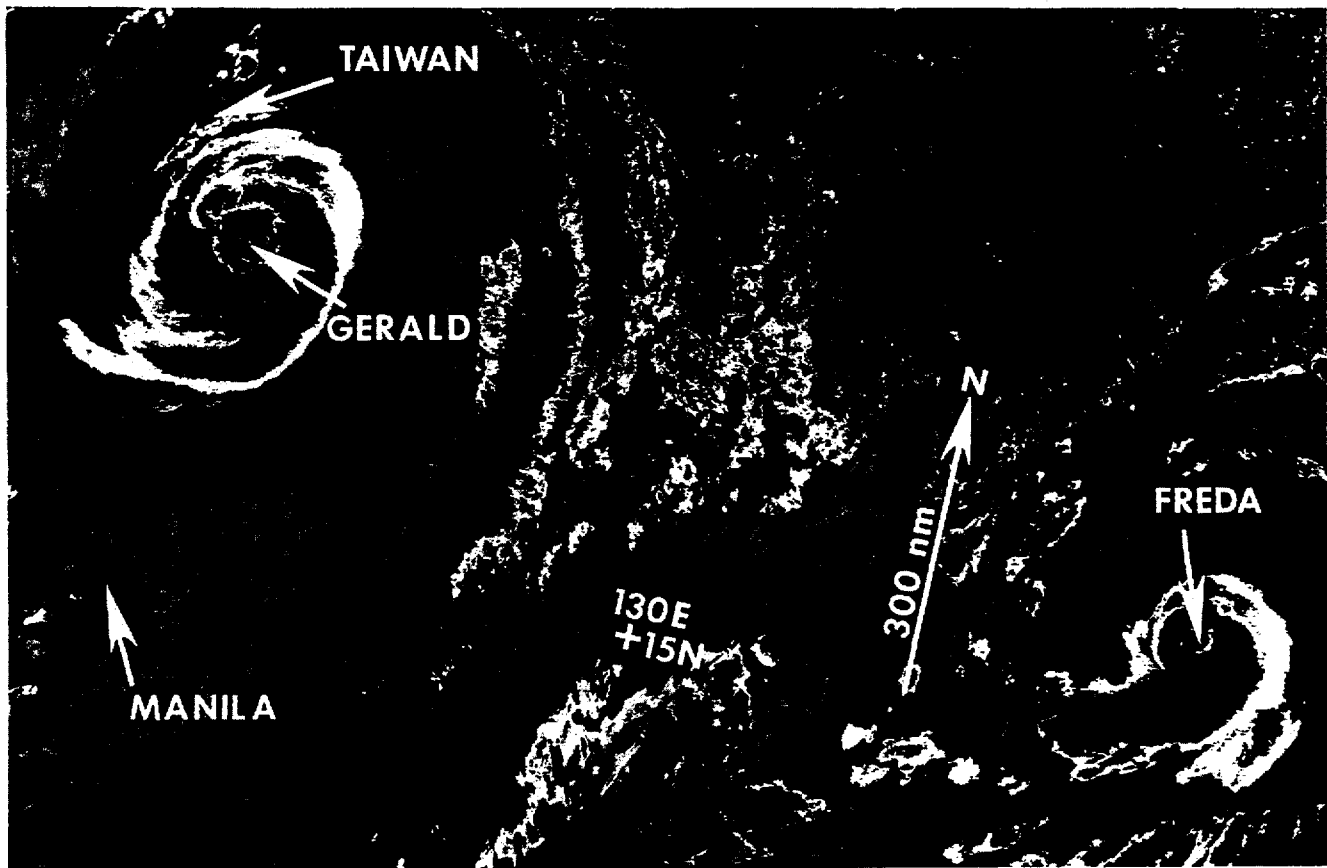


Figure 3-14-4. Typhoon Gerald at maximum intensity. The large eye is approximately 60 nm (111 km) in diameter. Prior to September, the 1987 season was characterized by an unusual number of 'midget' tropical cyclones. Typhoon Freda (13W), which also has an eye, is located approximately 1000 nm (1852 km) east-southeast of Gerald (082111Z September DMSP enhanced infrared imagery).

northwestward movement up the monsoonal trough began on the 7th, as did acceleration and intensification. The 081800Z warning signalled a major change in the expected movement of Typhoon Gerald. The forecast indicated Gerald would pass through the Luzon Strait and make landfall on the southeast coast of mainland China.

Typhoon Gerald, with a large classic eye 60 nm (111 km) in diameter, reached its maximum intensity of 105 kt (54 m/sec) at 081800Z (Figure 3-14-4). Later, Gerald skirted the southwest coast of Taiwan (Figure 3-14-5). The mountainous terrain reduced low-level inflow and Gerald began to weaken (Figure 3-14-6). Gerald continued to weaken over the Formosa Straits and made landfall on the China

coast 50 nm (93 km) east-northeast of Amoy, a city about 245 nm (454 km) east-northeast of Hong Kong. The remnants of Gerald dissipated over land and were no longer apparent on either satellite imagery or synoptic data after 110000Z.

Typhoon Gerald caused extensive damage to Taiwan and China. In Taiwan, five people died and over \$10 million in damage was caused by heavy rain and flooding. Up to 16 inches (41 cm) of rain was reported in parts of the Zhejiang Province, China (south of Beijing). Flooding inundated more than 1,950 square miles (505,440 hectares) of farmland, causing widespread damage to crops valued at \$121 million. The Chinese death toll from Typhoon Gerald was 122.

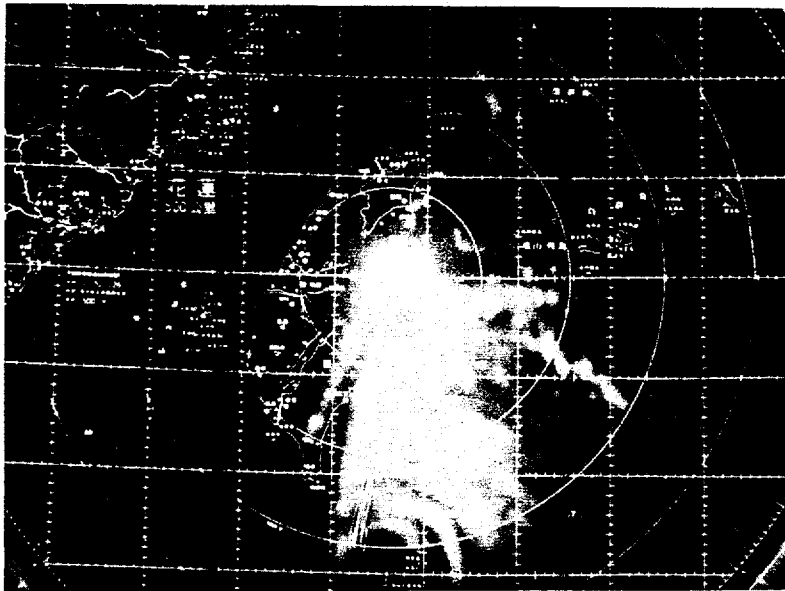


Figure 3-14-5. Radar presentation of the concentric rainbands of Typhoon Gerald as seen from Hualien, Taiwan (WMO 46699) at 090200Z September (Photograph courtesy of Central Weather Bureau, Taipei, Taiwan).

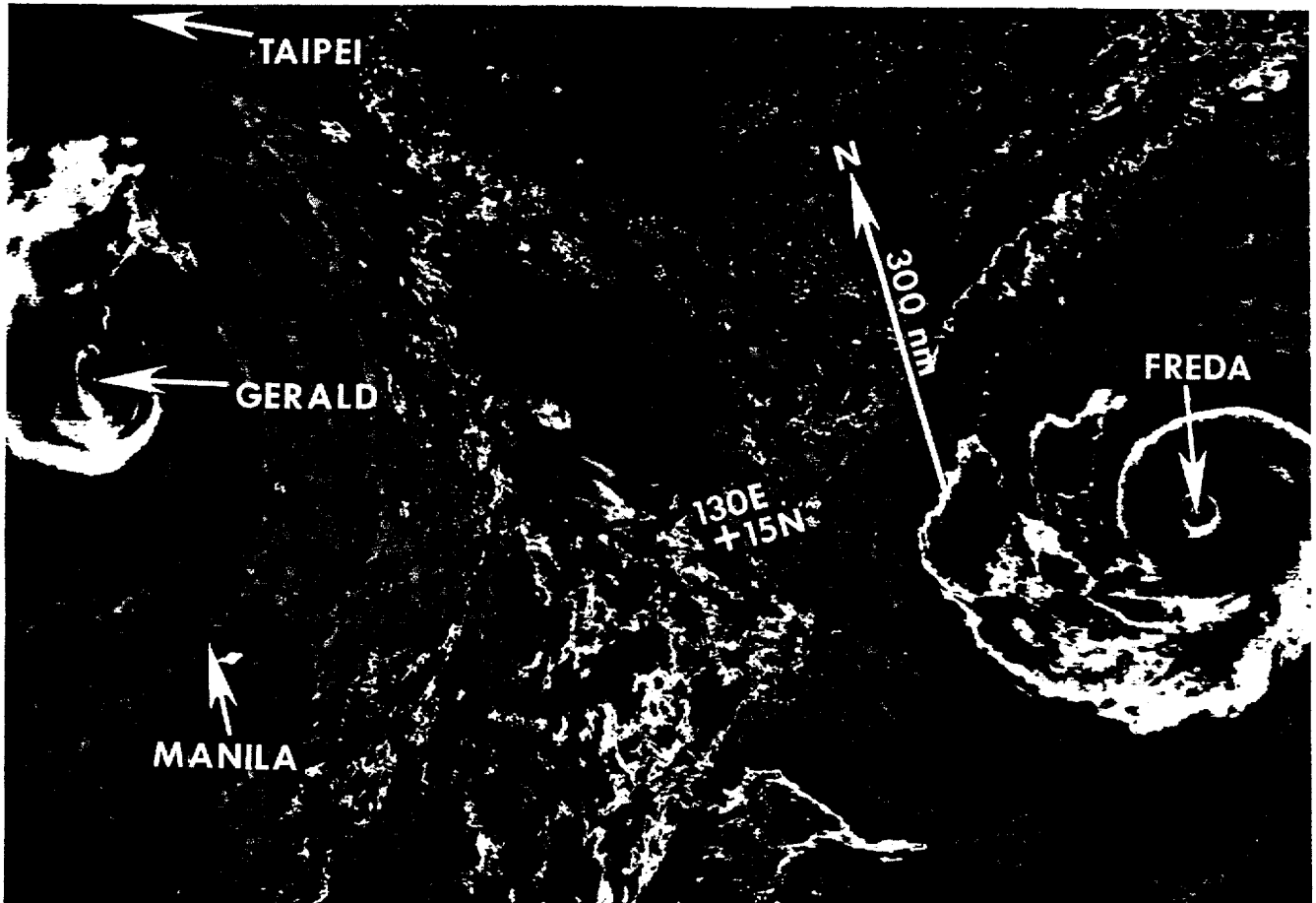


Figure 3-14-6. The effect of land interaction on Gerald's cloud pattern. This enhanced infrared image shows the distinct break in the central cloud mass to the north of the eye, which is related to lee-side subsidence over western Taiwan. This cloud-minimum area parallels the ridge line of mountainous central Taiwan (090956Z September DMSP infrared imagery).